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THE TREND OF PRICES.¹

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If a person were to make a chart showing the daily fluctuations, or price movements, of some agricultural products, as wheat, corn or cotton, he would probably see a jagged line, with ups and downs, and very little or no regularity.

But if he should examine the price changes more intimately, making averages in various combinations, he would find that, behind the current, apparently irregular movements, certain general trends or tendencies exist.

For the purpose of analysis, we may assume that the price of an article at any time is subject to three distinct influences, resulting in three different kinds of trends.

These three price trends are briefly, first the seasonal trend or cycle of prices. Prices are usually lowest at harvest time, when marketings are heavy, and then advances, to decline again when the next harvest comes on the market.

The second trend is the upward and downward of the yearly average price, under the influence of supply and demand of the specific product considered, the average tending upward when the year's production is short and downward when production is large. Production is influenced largely by climatic and other conditions beyond the control or forecast of man. We may therefore always expect these yearly ups and downs.

The third trend or price movement is that which extends over a number of years; it is due to general financial and industrial conditions, to change in the general purchasing power of money, the medium of exchange, rather than to the supply and demand of a particular product. This movement is shown most clearly by index numbers of yearly prices of a group of commodities. When the purchasing power of the dollar increases, prices of commodities in general tend to decline; when its purchasing power decreases prices of commodities in general tend upward.

¹ Paper read at the eleventh annual meeting of the American Farm Economic Association, December 31, 1920.

Let us consider these three tendencies separately in a little more detail; and first, the seasonal trend or variation.

If we should chart, say, the five or ten year average price, by months, of some agricultural commodity we would very likely have, not an irregular or jagged line but a more or less gracefully curved line, steadily advancing from a minimum to a maximum, and then declining rather sharply to the minimum. If we should also chart, in the same way, the average monthly marketing of the same product we might also expect to see a regular curved line, but inverse to the price line.

A tabulation is here given, showing, by months, the index number of prices to farmers of the United States of ten crops combined, and, the monthly average receipts by farmers from the sale of crops.

	Price Index, 100 = December.	Total Sales, 100 = Value Year's Total.
January	103	7.4
February	105	5.2
March	107	5.3
April	109	4.6
May	112	3.9
June	113	3.1
July	112 +	6.5
August	111	7.8
September	108	12.4
October	104	15.5
November	100 +	15.7
December	100	12.6

The prices here given are based upon the average farm price for the seven years 1908-1914, inclusive. This period was taken because the collection of monthly farm prices was begun in 1908, and 1914 was the last year before the abnormal war influences. Conditions were fairly normal during these seven years. It will be observed that the price movement when averaged is very regular, as is also the variation in the rate of marketing. Prices are lowest, considering all crops, early in December, advance steadily reaching the maximum in June, thence declines. Marketing of crops is heaviest in November, then decreases steadily until June, and then increases, forming a regular cycle.

Similar trends will be shown, if we confine our observation to specific products. For example, I give below, for wheat, corn and oats separately, the relative monthly price paid to farmers of the United States, and the percentage of the crop marketed by months.

	Wheat.		Corn.		Oats.	
	Relative Price.	Percent Marketed.	Relative Price.	Percent Marketed.	Relative Price.	Percent Marketed.
January.....	102	5.9	101	14.0	103	7.2
February.....	103	4.8	104	10.4	105	6.7
March.....	104	3.7	107	7.4	108	5.0
April.....	106	3.4	112	5.7	110	4.0
May.....	108	3.5	118	6.6	112	5.2
June.....	109	3.2	120	6.1	113	5.5
July.....	105	12.5	123	5.3	109	8.1
August.....	102	14.5	127	5.8	104	17.2
September.....	100	16.3	125	5.7	101	13.7
October.....	101	14.2	116	6.1	100	11.6
November.....	100	10.2	106	11.7	100	8.0
December.....	100	7.8	100	15.2	101	7.8

The seasonal cycle is much wider in the case of some crops than of others; thus taking the United States farm price average, the range from monthly low to high is only about 9 percent for wheat, 13 percent for oats, 27 for corn, 30 for potatoes and 75 percent for eggs. In general, the variation is least with crops which are non-perishable and easily kept, and widest with perishables, those which shrink in weight and are kept with more or less difficulty.

A fairly close relation is seen between the seasonal cycle of prices, and the seasonal cycle of marketing. The marketing cycle is not the same in different parts of the country, but is influenced by the time of harvest, the low point coming earlier in the southern states than in the northern states. Therefore prices do not advance or decline uniformly throughout the country.

Consider wheat, for example, in the tier of states from North to South, including the Dakotas, Nebraska, Kansas, Oklahoma, and Texas. The maximum price in each state is reached in May, but the minimum price occurs in July and August in Texas and Oklahoma, in August and September in Kansas and Nebraska and in October and November in the Dakotas.

We thus see that the seasonal trend or cycle of prices has a geographical variation, its minimum generally moving from south to north, with the progress of harvest. When we see wheat normally advancing 2 percent in Texas between August and September and at the same time declining 7 percent in the Dakotas, we can not say, without qualification, that Chicago or some foreign market makes the price in the local markets of this country.

*Relative farm price of wheat, 1908-1914,
100 = for each state price in month when at minimum price.*

	Texas.	Okla.	Kans.	Nebr.	S. D.	N. D.
March.....	112	113	111	109	109	109
April.....	113	114	113	111	111	111
May.....	113	116	114	113	114	113
June.....	107	108	110	109	112	112
July.....	100	100	103	102	111	112
August.....	100	100	100	100	108	109
September.....	102	103	101	100	101	102
October.....	104	105	103	101	100	100
November.....	106	105	103	101	101	100
December.....	107	105	103	102	102	102

Oats affords a striking example of the influence of latitude upon the seasonal price cycle:

*Relative farm price of oats, 1908-1914,
100 = for each state, price in month when at lowest price.*

	Texas.	Okla.	Nebr.	S. D.	N. D.
January 1.....	119	114	107	106	112
February 1.....	...	...	...	...	...
March 1.....	130	129	113	113	117
April 1.....	128	126	115	117	120
May 1.....	128	130	118	118	123
June 1.....	127	129	118	121	125
July 1.....	107	113	117	122	126
August 1.....	100	100	108	116	128
September 1.....	106	102	104	102	108
October 1.....	109	105	103	101	101
November 1.....	111	105	100	100	100
December 1.....	113	105	103	101	102

Observe that in Texas the price is lowest when in North Dakota it is highest.

This one cycle seasonal trend is characteristic I believe of all crops. It may be observed however that there is frequently a dip, or temporary check, in the upward trend in March with the opening of spring, and a temporary increase in marketings. Hogs afford an interesting example of two-price cycles in a year, the two maximums occurring in April and September and the two minimums occurring in June and December. This double cycle is coincident with the double (spring and fall) farrowing seasons.

The extent of the seasonal variation of prices has an important

bearing upon the question as to whether it pays a farmer to hold or to sell his crop at harvest time. If the normal range from low to high in the price cycle exceeds the cost of holding, it would seem profitable to hold, on the other hand, if the cost of holding exceeds the seasonal advance in holding, there would be a loss by such holding.

It has been estimated that the cost of holding wheat for one month is $1\frac{1}{2}$ percent, four months at 6 percent, eight months at 10 percent and 10 months at 11 percent, that is, the price must advance 11 percent in ten months before any profit can be secured. I believe that these estimates are high, if applied to farmers who have reasonable facilities of holding their grain. But we will assume that these estimates are about correct. Now an examination of the average farm price of wheat on the first of each month by States for the seven years 1908-14 shows in most States a slightly wider range than the estimated cost of holding, for example, the average increase during ten months, from August 1 to June 1, in Ohio is 17 percent, Indiana 18, Illinois and Michigan 15 percent, Missouri 19 percent, Nebraska 14 and Kansas 15 percent. In eight months, from October 1 to June 1, the average increase is 16 percent in North Dakota and 15 percent in South Dakota. In the six months from December 1 to June 1, the increase is 9 percent in Wisconsin, 13 percent in Minnesota and 10 percent in Iowa. These comparisons would seem to indicate that in the long run it will pay the farmer to hold, if he has the facilities to do so. It is interesting to observe that although the low price is reached at different dates in different States, being influenced by the time of harvest, the maximum price is reached in nearly all States at nearly the same time. Thus the June 1 price is the highest 1st of month average price in 31 of 37 wheat growing States, the 6 exceptions being only slight, whereas there are 18 States with low on August 1, 6 on September 1, 9 on October 1, one on November 1, and 3 on December 1.

In the case of corn both price and cost of holding varies from month to month more widely than does wheat, but the advance in price is greater than the cost of holding, justifying holding when facilities permit; thus the increase from the low to high average price is 33 percent in Ohio, 36 in Indiana, 31 in Illinois, 34 in Iowa, 28 in Nebraska, and 27 percent in Kansas.

It has been estimated that to break even for holding corn, the price should advance 7.4 percent the first month, 8.5 percent in two months, 9.3 percent for three months, 11.7 percent for four months. The minimum price in the corn belt states occurs between December 1 and

January 1, and the maximum price about September 1, or eight to nine months after the low point.

In oats the increase from low point to high point is about 20 per cent, most of the State ranging between 18 and 22 per cent. The averages shown for this grain crop would seem to indicate that it does not usually pay to hold for only one or two months, nor for more than ten months after harvest, the optimum being about eight months.

The advance from low to high is generally greater in localities of large surplus than in localities of deficient production. For example, Iowa produces much corn and little wheat; North Dakota produces much wheat and little corn; the increase from low to high for wheat averages 11 per cent in Iowa and 16 per cent in North Dakota; and for corn 33 per cent in Iowa and 15 per cent in North Dakota.

The conclusion, from the examination of price trends, that it pays in the long run to hold rather than to sell at harvest, is in harmony with what might be expected when one considers that during the harvest period the offerings exceed the consumptive demand, whereas later in the season the conditions are the reverse.

The effect of variations in crop production upon prices is readily seen in a general way by relatively high prices with short crops, and low prices with large crops. But a measure of the effect of a given degree of shortage or excess of production upon price is not easily determined. In the Seventh Century Gregory King reckoned that a defect of 10 per cent in the corn harvest would raise the price 30 per cent, a defect of 20 per cent raise the price 80 per cent, a defect of 30 per cent raise the price 160 per cent, a defect of 40 per cent raise the price 280 per cent and a defect of 50 per cent raise the price 450 per cent. Whether this relation between grain harvest and prices ever actually held I do not know, but I have manipulated the available crop and price data of the past 50 years in the United States, and have been unable to discover so striking a tendency as indicated in the so-called law of Gregory King. Modern transportation and credit facilities make such law inoperative for a limited area, as a county or state or even a nation. We know that a county may have a total crop failure without causing increased price if production elsewhere, enabling shipments into the country, is large.

It has been noted that in India where famines are not infrequent, prices of foodstuffs during such calamities do not rise in much greater proportion than the shortage, due, not to supplies coming from elsewhere, but to the reduced purchasing power of the natives, as a consequence of such famine.

I am inclined to suspect that a slight defect, not merely of harvest, but of supply, of any particular product in any locality, causes a relatively greater change in price than a more material defect. Because, in any given area habit is at first strong in stimulating demand for the short supply, and there is more or less inertia to be overcome before outside supply meets the local deficiency, but with greater shortage, this inertia is overcome, competition of substitutes come into play, and the advance is checked.

The yearly average price of a commodity in any limited area, as county or state, is of course influenced by both local production and by general production.

It is difficult to measure the strength of these two factors, local and general production, upon local price; they seem to vary considerably. I believe however that there is an inclination on the part of most of us to underestimate local conditions, or exaggerate general influences in determining a local price, as exemplified in the common expression that Chicago or the exports makes or determines the local price. Wheat prices in the United States are probably influenced more by world conditions than any other crop; and yet the spread or difference of price between different local market points vary widely from year to year; as may be shown by the annexed table showing the average price of wheat east and west of the Mississippi River.

Wheat price, east and west of Mississippi River.

	Production.		Price.		
	West Percent.	East Percent.	West Cents.	East Cents.	Difference Cents.
1912.....	84	16	76.8	97.6	20.8
1911.....	66	34	90.2	94.1	3.9
1910.....	67	33	88.8	95.1	6.3
1909.....	72	28	93.6	110.2	16.6
1908.....	..	..	87.9	96.7	8.8

In some years the price of wheat averages more than 25 percent higher east of the Mississippi than it does west of the Mississippi; in other years, less than 5 percent higher.

The third kind of price trend referred to, the long-time trend, due to the change in the value of the dollar, has been the dominant price factor since 1915. Size of production or cost of production have had little to do with the rapid advances. But even before 1915, that is since about 1896, the general level of prices has been creeping upward, whereas during the twenty-five years preceding 1896 they

tended downward. This downward trend to the nineties and upward tendency since then, is seen in the index number of commodity prices, of all important countries, as England, France, Germany, and Italy, showing the universality of the movement.

Within the past five months, we have been witnessing enormous declines in the prices of agricultural commodities. During these four months all three of these price tendencies or influences have been working in the same direction; the seasonal cycle is downward in the latter part of the calendar year. Crop yields this year have turned out not only larger than average but much larger than anticipated early in the season. There is every evidence that the turning point has been reached in the upward trend in the general level of prices and that we are beginning on a downward movement.

When these three tendencies are operating in the same direction we may expect a greater change in price than when they counteract each other. In a consideration of the probable movement of prices of a commodity at any time one should consider these three influences separately, and then their probable resultant.

In the long time upward and downward trend in the general level of prices, every thing does not rise and fall in unity, but there are varying degrees of lag. In general raw materials with an open market are the first to respond to such change. Farm crops are such products. Therefore they were generally the first to advance and are now the first to fall. Wholesale prices and retail prices lag as do land values and wages, etc.

Much has been said and written about the scarcity and high price of farm wages during the past five years. But during the years of the greatest of such complaint, that is during 1916, 1917, 1918, and 1919, farm laborers, although their wages were increased in dollars, received less purchasing power of the things they produced than they did normally before the war.

If farm laborers had exchanged their wages for wheat at current values, they would have received, in 1912, 468 bushels; in 1913, 456; in 1914, 360; in 1915, 384; in 1916, 240; in 1917, 240; in 1918, 276; and in 1919, 312 bushels, but the farm laborer more than comes to his own in 1920 with 516 bushels. In the four years 1916-19 he received an equivalent of only 268 bushels of wheat a year, as compared with 420 in the four years before. Similarly as to corn, the laborer received an equivalent of only 438 bushels in 1916-19, as compared with 612 bushels in the preceding four years. The returns from only 17.8 acres would pay a year's wages during the past four years.

whereas 21.7 acres were required before. Of course, this relatively lower wages during the war, and relatively high wage the past year, are due to the lag in wages.

To conclude, and to summarize, if we wish to estimate the probable trend of the price of a commodity at a particular time, it may be convenient to consider separately the three component forces which largely influence the direction and then consider the probable joint effect. A knowledge of the seasonal cycle is necessary to know the best time in the year, on the average, to sell. To the question does it pay the farmer to hold at harvest, I believe, in general, for well-to-do farmers, the answer is yes, but with some exceptions.

A study of yearly average prices in different parts of the country, in conjunction with relative production, would throw much interesting light on the relative influence of local and of general conditions on local price.

It will also show the limitations to the so-called Gregory King law of prices.

A study of the movement of general price levels, besides aiding in forecasting the trend of a particular product, is instructive in measuring the degree of inertia of different kinds of transactions. Raw materials produced by farmers, are generally the most sensitive to changing monetary or general conditions.